Postdoc Topic at LRCS, Amiens, FRANCE https://www.lrcs.u-picardie.fr/	
Topic Title	Computational Inverse Design of PEM Fuel Cell Electrodes
Supervisor	Prof. Alejandro A. Franco (alejandro.franco@u-picardie.fr)
Collaborations	Automotive Company
Funding Source, Name of project	Industry
Web Site of Advisor (if applicable)	http://modeling-electrochemistry.com/ https://www.u-picardie.fr/erc-artistic/?L=0
Date of publication of the offer	April 16th, 2020
Deadline for application	Offer open until position filled.
Date of start of the Project	As soon as possible. Position is for 1 year.
Description of the Topic/ Techniques to be used	Polymer Electrolyte Membrane Fuel Cells (PEMFC) constitute an important alternative energy solution to reduce societal dependence on internal combustion engines and lead acid batteries. They give the promise of significantly improved energy efficiency with zero or low greenhouse gas emissions, and they are expected to play a key role in the hydrogen economy. Despite tremendous research efforts and very significant technological progress since the late 1980s, PEMFCs are still facing some challenges in regards of their application in Electric Vehicles, such as cost, tolerance to external pollutants and aging. The traditional approach in PEMFC research consists at looking how manufacturing conditions impact their components (e.g. electrodes) micro and mesostructures and how those impact the cell electrochemical response. This approach has driven the majority of theoretical and experimental studies. However, there is a lack of cohesive theory allowing to predict, given performance and durability targets at given operation conditions, what is/what are the ideal components micro/mesostructures in order to fulfill those targets. We propose here a postdoctoral job to develop and apply an innovative theoretical inverse design approach to PEMFC components such as electrodes, micro-porous and gas diffusion layers. Such an approach will encompass continuum computational techniques, topological optimization and machine learning algorithms, getting inspiration from the approach developed by us in the context of one of our ongoing projects on Lithium Ion Batteries (https://www.u-picardie.fr/erc-artistic/). Expected results will include optimized components architectures for given performance targets. This work will be carried out in strong collaboration/interaction with an automotive company.
Skills of the Applicant	• Excellent skills in theoretical physics, and physical-chemistry and/or electrochemistry; • Knowledge about optimization algorithms and machine learning techniques; • Excellent skills and/or deep experience in programming (*e.g.* Matlab, Python, Comsol Multiphysics®);

	• Experience in the fuel cell domain will be a plus; • Excellent organizational and time-management skills; • Ability to communicate results clearly and succinctly: the candidate will report regularly about her/his work to our partner company; • Ability to work as a team member and to work independently; • Excellent level of English, both written and spoken; • Candidates for postdoctoral positions should have a recently obtained PhD diploma (not older than 2 years at the application date) and a significant track record of publications.
Contact	alejandro.franco@u-picardie.fr
List of documents to provide	• Detailed CV; • Copy of the 3 most recent publications (if available); • Motivation letter specific to this project (applications with generic motivation letters will not be responded); • The names and contact details of 4 reference persons, at least from 2 different institutions.